

## **CSS Long Term Control Plan Update**

# **Combined Sewer System (CSS) Sewershed Changes**

**City of Alexandria  
Department of Transportation and Environmental Quality**

FINAL – January 2015



**GREELEY AND HANSEN**

## Combined Sewer System Sewershed Changes

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## **Combined Sewer System Sewershed Changes**

### **Executive Summary**

### **Executive Summary**

The LTCPU will consider and incorporate anticipated and future changes to the sewershed so that the CSO controls will continue to meet their intended goals. In the City of Alexandria most of the sewershed is built out, however there are redevelopment projects anticipated. As part of the requirements for redevelopment the City has implemented the Area Reduction Plan (ARP). The ARP generally requires developers to separate storm and/or sanitary sewers during new and redevelopment projects within the CSS sewershed, whenever practicable. Or when separation is infeasible, the project developer pays into a fund to support City-led separation projects.

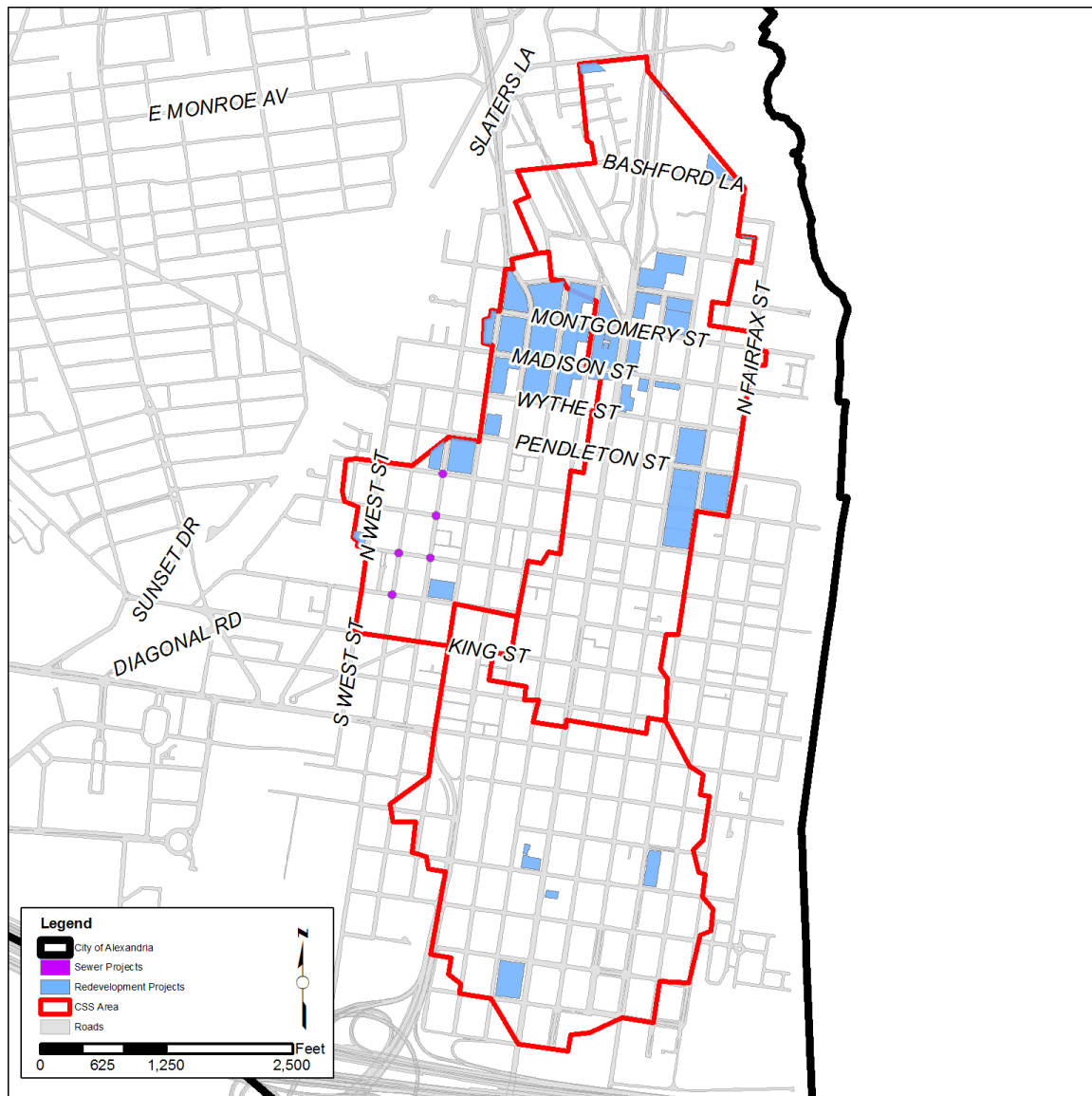
Anticipated changes made to the Combined Sewer System (CSS) area will be taken into account in the LTCPU. These anticipated changes include projects that are in the planning stages of development or under design, projects under construction, and projects nearing completion. For the most part, these changes can be classified into redevelopment projects or sewer system projects. Both these type of projects have the opportunity to change both the amount of flow being delivered to the sewer system as well as the current configuration of the sewer system. The separation projects only remove the sanitary flows from the CSS; therefore the stormwater flows remain unchanged. An overview of the redevelopment projects and sewer system projects can be seen in Figure ES-1.

It is estimated that the current list of redevelopment projects has the potential to remove approximately 65,500 gallons per day (gpd) of sanitary flow from the CSS. The flows that are separated from the CSS through redevelopment will be directed to one of the City's interceptor sewers. As part of another effort the City has developed flow projections which predict the flows from each of the sewersheds within the City. The flows diverted from the CSS to the interceptor sewers are already accounted for in the City's flow projections. The City's hydrologic and hydraulic model will be updated to account for future flows and to address sanitary flows removed from the CSS.

## Combined Sewer System Sewershed Changes

### Executive Summary

**Figure ES-1**  
**Overview of Redevelopment and Sewer System Projects**



## Combined Sewer System Sewershed Changes

### Section 1

## Section 1 Redevelopment Projects

This technical memorandum will identify redevelopment projects within the CSS in the short term; this technical memorandum does not intend to list all the redevelopment projects in the City through 2040, only those that are in the final planning stages or construction within the CSS. This information will be used to determine the amount of sanitary flow removed from the CSS. These flows will be diverted to the interceptor sewers; however, the added flows in the interceptor sewers are already accounted for in the *Flow Projections Technical Memorandum*. When performing hydrologic and hydraulic modeling, the flow projections will be used as inputs to the model for planning and CSO control selection purposes.

This technical memorandum also demonstrates the City's commitment to reduce the overall area of the CSS by separating the storm and sanitary sewers over time as development opportunities arise. The City has developed a Combined Sewer System Area Reduction Plan (ARP) that identifies the system modifications, associated costs, and environmental impacts of separating portions of the CSS deemed especially conducive to separation relative to the CSS area as a whole. The ARP provides a roadmap for separation of storm and/or sanitary sewers during new and redevelopment projects within the CSS sewershed, whenever practicable. The City requires developers to separate their site if they wish to redevelop portions of the CSS. Overall the projects identified below do not have any storm sewer separation as do most of the past redevelopment projects in the CSS. This is because there isn't much stormwater infrastructure in the CSS. The ARP has been developed in such a way that a new sanitary sewer system is constructed while the existing CSS system would only be used for stormwater effectively making it a storm sewer system. There may be instances where separation associated with a redevelopment project may be infeasible, in these cases the developer will pay into a City fund that will be used for City-led separation projects.

With any redevelopment, the most significant CSS change will be the possible change in flow being delivered to the sewer system. When applicable, any redevelopment occurring within the City of Alexandria is required to separate any combined sewer service areas through the separation of sanitary sewers, storm sewers, or both. Any changes to the CSS area will influence future planning decisions.

The projects identified in this technical memorandum are those that are in the planning stages of development or under design, projects under construction, or projects nearing completion. Depending on the development type, the following assumptions, which were obtained from the Institute of Transportation Engineers (ITE), the U.S. Department of Energy (USDOE), or the San Diego Association of Governments (SANDAG), were used to estimate the number of employees:

- For grocery stores, there is one employee per 938 sq. ft.
- For restaurants, there is one employee per 134 sq. ft.
- For retail stores, there is one employee per 549 sq. ft.
- For elementary schools, there is one employee per 1,250 sq. ft.
- For offices (under 100,000 sq. ft.), there is one employee per 228 sq. ft.
- For lodging, there is one employee per 1,124 sq. ft.

To estimate the amount of flow for the different redevelopment projects, the following assumptions, which were obtained from the Metropolitan Washington Council of Governments (MWCOC) were used:

## **Combined Sewer System Sewershed Changes**

### **Section 1**

- Each household produces 150 gallons of wastewater per day
- Each employee produces 30 gallons of wastewater per day

The projects described below have the potential to reduce the flow as well as the bacteria load in the CSS. These reductions will be used in future planning and modeling to assess the long range goals of the LTCPU. More specifically, the redeveloped areas will be removed from the CSS portion of the City's hydraulic model.

## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1 Flows to CSS Area

There are a total of ten anticipated redevelopment projects that have the potential to remove sanitary flow from the CSS area. The projects are discussed in further detail in the subsections below. A tabulation of the estimated flow removed from the CSS for each project is provided in Appendix A.

##### 1.1.1 600 N Henry Street Redevelopment

The 600 N Henry Street Redevelopment project is bounded by the postal office to the north, Pendleton Street to the south, N Henry Street to the east and N Fayette Street to the west. The 20,995 sq. ft. property is currently home to an office/commercial warehouse building that has a floor space area of 10,328 sq. ft. The project, which is still in the planning phase, is focused on installing new open space at the property. The sewer separation associated with the redevelopment can potentially remove 869 GPD of sanitary flow from the CSS area. The location of the 600 N Henry Street Redevelopment project can be seen in Figure 1-1.

**Figure 1-1**  
**600 N Henry Street Redevelopment Location**





## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.2 Church of God and Saints of Christ

The Church of God and Saints of Christ redevelopment project is bounded by Wythe Street to the north, residential units to the south, N Patrick Street to the east and a United States Postal Service office to the west. There is currently a 1,726 sq. ft. historic church located on the property, which has a total lot area of 6,442 sq. ft. The redevelopment plan involves the construction of a 2,725 square feet addition to the historic church. The additional space will include a fellowship hall, lobby, vestibule, kitchen, restrooms, a conference room, and office space. It is not currently anticipated that this project will remove any sanitary flow from the CSS area. The location of the Church of God and Saints of Christ project can be seen in Figure 1-2.

**Figure 1-2**  
**Church of God and Saints of Christ Location**



## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.3 Cromley Row

The Cromley Row redevelopment project is bounded by Princess Street to the north, a City library to the south, office buildings to the east and N Columbus Street to the west. Redevelopment plans call for the construction of five residential townhouses on a site currently occupied by a surface parking lot. The project area itself is approximately 7,780 square feet in size. Open space is expected to account for at least 9% of the total floor area space. Since the area is currently occupied by a parking lot, no flow will be removed from the CSS area. The location of Cromley Row can be seen in Figure 1-3.

**Figure 1-3**  
**Cromley Row Location**



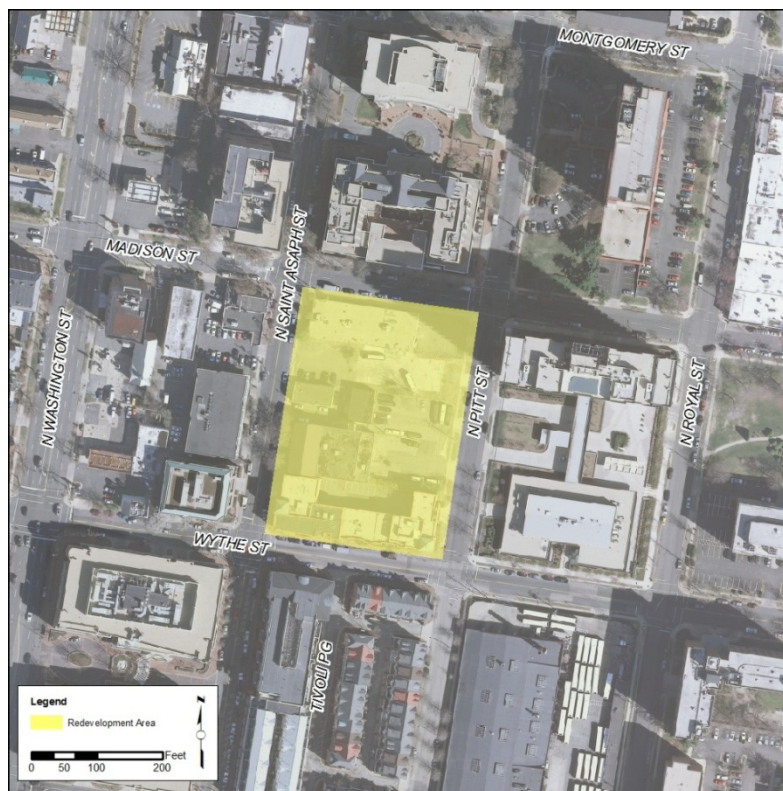
## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.4 Harris Teeter – Old Town North

The Harris Teeter – Old Town North redevelopment project is bounded by Madison Street to the north, Wythe Street to the south, N Pitt Street to the east and N Saint Asaph Street to the west. The size of the lot, which was predominantly vacant and was home to remnant warehouse buildings, a vacant gallery and dry cleaners, is approximately 65,000 sq. ft. The project involves the construction of a 52,000 square foot Harris Teeter grocery store and approximately 175 residential units on the property. The apartments were expected to be completed in May 2014 while the grocery store is expected to open in September 2014. The proposed redevelopment called for the open space floor area to be 40% of the total lot size. The sewer separation associated with the redevelopment can potentially remove 5,717 gallons per day (GPD) of sanitary flow from the CSS area. The location of the Harris Teeter – Old Town North project can be seen in Figure 1-4.

**Figure 1-4**  
**Harris Teeter – Old Town North Location**





## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.5 James Bland Redevelopment

The James Bland Redevelopment project is bounded by First Street to the north, Wythe Street to the south, N Columbus Street to the east and N Patrick Street to the west. The total lot area of the redevelopment site is approximately 8.5 acres and is composed of five City blocks. The whole redevelopment area is being constructed in five phases, with each block constituting a phase. The phases are numbered counterclockwise with Phase 1 being the block between Madison Street, Wythe Street, N Alfred Street and N Columbus Street and Phase 5 being the block between Montgomery Street, Madison Street, N Henry Street, and N Alfred Street. Phase 1 was completed in 2010 and separated 1.44 acres of stormwater from the CSS area. Phase 2 is expected to be completed in 2014 and is supposed to separate 5.00 acres of stormwater from the CSS area. Phase 3 is currently under construction. Final buildout of the whole redevelopment project is anticipated to be completed by 2016. The project itself aims to increase the housing density in the area by demolishing 194 existing housing units and constructing 379 new housing units (a mix of townhouses and multi-family buildings). The proposed redevelopment called for the open space floor area to be about 30% of the total redevelopment lot size. The redevelopment is also expected to install separate sanitary sewers. The sewer separation associated with the redevelopment can potentially remove 28,200 GPD of sanitary flow from the CSS area. The location of the James Brand Redevelopment can be seen in Figure 1-5.

**Figure 1-5**  
**James Brand Redevelopment Location**



## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.6 Kings Building at 923

The Kings Building at 923 redevelopment project is bounded by a residential building to the north, King Street to the south, an office building to the east and N Patrick Street to the west. The site itself has a total area of 2,836 sq. ft. Redevelopment plans involve the addition of approximately 1,492 sq. ft. to the existing three-story vacant building, which has a total floor area of 4,309 sq. ft. The first two floors will be used as a restaurant while the third floor will be composed of residential units. The project is currently under construction. The sewer separation associated with the redevelopment can potentially remove 150 GPD of sanitary flow from the CSS area. The location of Kings Building at 923 can be seen in Figure 1-6.

**Figure 1-6**  
**Kings Building at 923 Location**



## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.7 The Madison

The Madison is a mixed-use redevelopment project bounded by a carpenter shelter to the north, Madison Street to the south, N Henry Street to the east and N Fayette Street to the west. The lot area of the redevelopment project is about 113,100 sq. ft. The site is a mixed use development that planned to add 360 residential units and approximately 9,672 square feet of retail space. Open space is expected to account for 45,281 sq. ft. of floor area space. The apartments opened for leasing in 2014. The sewer separation associated with the redevelopment can potentially remove 9,439 GPD of sanitary flow from the CSS area. The location of the Madison can be seen in Figure 1-7.

**Figure 1-7**  
**The Madison Location**





## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.8 Princess Street Townhouses

The Princess Street Townhouses redevelopment project is bounded by an office building to the north, Princess Street to the south, another office building to the east and N Alfred Street to the west.

Redevelopment plans call for the construction of three new townhouses on the currently vacant property measuring 7,926 sq. ft. in size. Open space is expected to account for at least 33.5% of the total floor area space. The sewer separation associated with the redevelopment can potentially remove 450 GPD of sanitary flow from the CSS area. The location of the Princess Street Townhouses can be seen in Figure 1-8.

**Figure 1-8**  
**Princess Street Townhouses Location**



## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.9 Royal Street Bus Garage Redevelopment

The Royal Street Bus Garage Redevelopment project is bounded by Wythe Street to the north, Pendleton Street to the south, N Royal Street to the east and N Pitt Street to the west. The area is currently home to an obsolete bus garage owned by the Washington Metropolitan Area Transit Authority (WMATA). The size of the lot is approximately 87,173 sq. ft and the buildings on the property account for 48,441 sq. ft. The redevelopment parameters as well as the design standards are still being finalized by the Royal Street Bus Garage Ad hoc Advisory Committee, a group established to provide guidance to both the City and WMATA in the redevelopment of the property. The property is zoned as a Residential Townhouse Zone. Since the site is located in the Pendleton sewershed, a CSS area, any redevelopment that occurs will be accompanied by sewer separation. The sewer separation associated with the redevelopment can potentially remove 9,883 GPD of sanitary flow from the CSS area. The location of the Royal Street Bus Garage Redevelopment can be seen in Figure 1-9.

**Figure 1-9**  
**Royal Street Bus Garage Redevelopment Location**





## Combined Sewer System Sewershed Changes

### Section 1

#### 1.1.10 Windows of Old Town

The Windows of Old Town Condominium redevelopment project is bounded by Third Street to the north, Second Street to the south, N Fairfax Street to the east and N Royal Street to the west. The site, which measures 30,724 sq. ft. in size, was originally home to offices and a warehouse structure. A condominium that has 21 residential units and 1,946 sq. ft. of retail space is currently under construction at the property. Open space is expected to account for 49% of the total floor area space. The sewer separation associated with the redevelopment can potentially remove 2,019 GPD of sanitary flow from the CSS area. The location of the Windows of Old Town Condominium can be seen in Figure 1-10.

**Figure 1-10**  
**Windows of Old Town Condominium Location**



## Combined Sewer System Sewershed Changes

### Section 1

#### 1.2 Handling of Separated Flows

The flows that are separated from the CSS through redevelopment will be directed to one of the City's interceptor sewers. As part of another effort the City has developed flow projections which predict the flows from each of the sewersheds within the City. The flows diverted from the CSS to the interceptor sewers are accounted for in the City's flow projections. These flow projections will be utilized in the hydrologic and hydraulic modeling associated with planning and CSO control alternatives selection.

#### 1.3 Green Infrastructure

In addition to redevelopment projects the City has been proactive in implementing green infrastructure throughout the City and will continue to do so as part of its LTCPU. One of the requirements in the City's current CSS Permit is to "...*study, implement, and promote green infrastructure projects within the CSS sewershed...*" The City is currently studying where to locate potential green infrastructure projects throughout the CSS and once a project has been identified, modifications will be made to the hydrologic/hydraulic model to account for the implementation of the recommended project.

## Combined Sewer System Sewershed Changes

### Section 2

## Section 2 Sewer System Projects

Rehabilitation of existing sewer system assets or the construction of new sewer system assets has the opportunity to impact the CSS area. Depending on the type and/or location of the project, the CSS area may be impacted directly (i.e. a change in the size of the CSS area) or indirectly (i.e. a change in the flows in the interceptors serving the CSS area). As mentioned previously, any changes to the CSS area will influence future planning decisions.

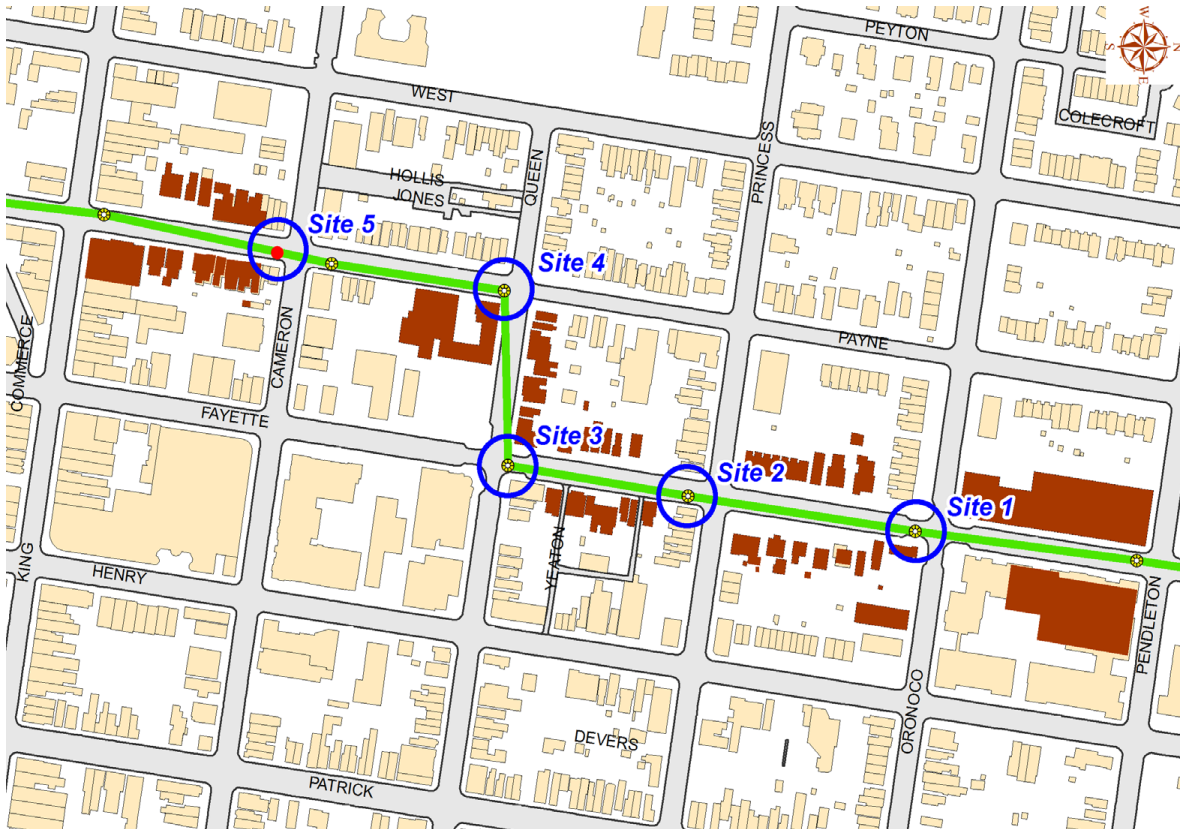
### 2.1 Payne and Fayette Sewer Separation

A current sewer system project is the Payne and Fayette Sewer Separation. This project involves disconnecting several sanitary sewers from the combined system and reconnecting these sewers to the Potomac Yard Trunk Sewer. It is estimated that at least 60 and as many as 92 properties will be separated. The separation projected will move approximately 9,000 – 13,800 GPD of sanitary flow from the CSS area to the Potomac Yard Trunk Sewer. Work on this project will be generally limited to the following five intersections: N Fayette and Oronoco Streets, N Fayette and Princess Streets, N Fayette and Queen Streets, N Payne and Queen Streets, N Payne and Cameron Streets. The project is currently in the design phase is planned to go to bid for construction in early 2015. An overview of the Payne and Fayette Sewer Separation project can be seen in Figure 2-1.

## Combined Sewer System Sewershed Changes

### Section 2

**Figure 2-1**  
**Payne and Fayette Sewer Separation Overview**



## 2.2 Other Sewer System Projects

All other sewer separation projects are currently in the preliminary planning phases. As the projects progress and the information becomes more concrete, this pertinent information will be incorporated into the LTCPU.

## Combined Sewer System Sewershed Changes

### Section 3

### Section 3 Summary of Project Flows

The sanitary flows generated by the different redevelopment projects are summarized in the following table. The sanitary flows for the Payne and Fayette Sewer Separation are listed in Table 3-1. Currently, the sanitary flows associated with these projects are being conveyed through the CSS area. After separation occurs, some sanitary flows will be transferred to the Potomac Yard Trunk Sewer while others will be transferred to the Potomac Interceptor. The sanitary flows associated with these projects will be removed from the CSS in the City's hydrologic and hydraulic model to represent future planning conditions.

**Table 3-1**  
**Project Flows Removed from the CSS Area**

Project	Sanitary Flow (GPD)
600 N Henry Street Redevelopment	869
Church of God and Saints of Christ	N/A
Cromley Row	N/A
Harris Teeter - Old Town North	5,717
James Bland Redevelopment	28,200
Kings Building at 923	150
The Madison	9,439
Princess Street Townhouses	450
Royal Street Bus Garage Redevelopment	9,883
Windows of Old Town	2,019
Payne and Fayette Sewer Separation	9,000 – 13,800
<b>TOTAL</b>	<b>65,728 – 70,528</b>

In addition to a reduction in flows, the removal of sanitary sewers also removes E. coli bacteria from the system.

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